



# The objectivity of local knowledge. Lessons from ethnobiology

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**Abstract** This article develops an account of local epistemic practices on the basis of case studies from ethnobiology. I argue that current debates about objectivity often stand in the way of a more adequate understanding of local knowledge and ethnobiological practices in general. While local knowledge about the biological world often meets criteria for objectivity in philosophy of science, general debates about the objectivity of local knowledge can also obscure their unique epistemic features. In modification of Ian Hacking's suggestion to discuss "ground level questions" instead of objectivity, I propose an account that focuses on both epistemic virtues and vices of local epistemic practices.

**Keywords** Objectivity · Ethnobiology · Local knowledge · Indigenous knowledge · Standpoint theory

Philosophical debates about objectivity typically focus on scientific case studies and pay relatively little attention to knowledge of local communities. Insofar as local knowledge is considered at all in these debates, it is often contrasted with objective knowledge. There are two common strategies of contrasting locality and objectivity. On the one hand, the notion of objectivity can be used to challenge the epistemic status of local knowledge. If objectivity requires universalizability, for example, genuinely local knowledge cannot be objective. On the other hand, it has become common in poststructuralist and postcolonial contexts to invert this contrast by using the notion of locality to challenge philosophical accounts of objectivity. Academic discussions that are explicitly concerned with "locality" often follow Foucault's (2003, p. 9) strategy

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“of playing local [...] knowledges off against the unitary theoretical instance that claims to be able to filter them, organize them into a hierarchy, organize them in the name of a true body of knowledge.”

This article will not follow either of these strategies but aim for a more nuanced account of the intersection of debates about objectivity and local knowledge. Any discussion with this aim faces the challenge that both “objectivity” and “local knowledge” are hopelessly ambiguous terms. “Local knowledge” is typically used as an umbrella term to engage with vastly different epistemic practices that are not institutionalized as science. Instead of aiming at a general definition of “local knowledge”, I will focus on current ethnobiological research on Indigenous knowledge about the biological world. Of course, Indigenous knowledge is only a subset of local knowledge and ethnobiology is only concerned with a subset of Indigenous knowledge. Still, ethnobiology provides an excellent starting point for a discussion of local knowledge that is informed by the details of empirical case studies.

Engaging with these case studies from ethnobiology leads to a complex picture beyond the simple contrast between objectivity and locality. Indeed, local ethnobiological knowledge satisfies many standard criteria for objectivity in philosophy of science and can also be interpreted in the framework of standpoint theory as contributing to a “strong objectivity” (Harding 1995). However, I argue that general debates about the objectivity of local knowledge obscure how knowledge systems come with different epistemic virtues and vices. I therefore propose to move beyond the question whether local knowledge is objective to a more detailed discussion of the epistemic features of different knowledge systems.

My discussion will proceed in three steps. Section 1 starts with Hacking’s (2015) suggestion to replace objectivity debates with more specific discussions of epistemic vices. Pace Hacking, I argue that the suggestion fails in ethnobiological cases where the validity of an entire knowledge system is questioned. Local knowledge systems are often suspected to lack core virtues that are associated with objectivity and an exclusive focus on epistemic vices therefore turns out to be a privilege. Section 2 addresses two virtues that are often associated with objectivity. I argue that both virtues are common in local ethnobiological knowledge of Indigenous communities. Section 3 returns to Hacking’s proposal to substitute general objectivity talk with discussions of more specific “ground level” questions. I argue that Hacking’s proposal becomes convincing if we include both epistemic virtues and vices in a discussion of ground level questions.

## 1 Objectivity and epistemic vices

Objectivity is commonly perceived as an epistemic virtue that has a legitimizing function. As Reiss and Sprenger (2013) put it: “To call a thing objective implies that it has a certain importance to us and that we approve of it.” Given that objectivity has a legitimizing function and is commonly associated with modern science, local knowledge can easily become delegitimized by being characterized as lacking this essential virtue (Aikenhead 2008). This problem of delegitimization is especially obvious in philosophical accounts that tie objectivity to universalization. If the notion of objec-

tivity is spelled out in terms philosophical conceptions such as Nagel's (1989) "view from nowhere" or Williams' (1985) "absolute conception", knowledge cannot be both local and objective in a substantial sense.

One can respond to this challenge by rejecting accounts of objectivity that rely on universalization and by endorsing alternative proposals that leave room for local perspectives. And indeed, the compatibility of objectivity and contingent perspectives is commonly addressed in recent debates about objectivity in both history and philosophy of science (e.g. Daston and Galison 2008; Kukla 2006). Furthermore, feminist standpoint theory (e.g. Intemann 2010; Crasnow 2013; Harding 2015) goes a step further by arguing for more than just compatibility of locality and objectivity. Instead, standpoint theorists stress that the locality of standpoints actually contributes to a "strong objectivity" (Harding 1995) that makes the recognition of biases in mainstream research possible.

While it is tempting to overcome the contrast between locality and objectivity with an inclusive interpretation of objectivity, there remain problems with the ambiguity of the concept of objectivity (e.g. Daston and Galison 2008; Freedman 2009; Douglas 2004). No matter whether locality and objectivity are presented as competitors or complements, each account has to rely on a controversial specification of the concept of objectivity before being able to address questions of locality. In a recent article, Hacking (2015) provides a radical solution for this problem by urging us to simply "stop talking about objectivity". Hacking's eliminativist proposal is not motivated by an opposing subjectivist doctrine but by the assumption that "objectivity" is an ambiguous and confusing "elevator word." Giving up the notion of objectivity does not imply that we give up important epistemological issues that are often associated with objectivity talk. For example, it is certainly important to consider biases in research or to discuss conflicts of interests. However, Hacking stresses that we can discuss these "ground level questions" without invoking the elevator word "objectivity". More specifically, Hacking suggests that objectivity talk does not indicate the presence of a specific virtue but can be understood as the "proclaimed absence of this or that vice" (2015, p. 26).

To clarify this proposal, Hacking provides the case study of the sudden decline of Sockeye Salmon in the Fraser River in Canada. While Sockeye Salmons traditionally travel upstream from the Pacific Ocean, the annual run did not occur in 2009. Given the contested nature of the phenomenon that affected various stakeholders such as conservation biologists, First Nations, and salmon farmers, it is not surprising that the objectivity of some of the involved research became discussed in a quickly established commission. However, Hacking argues that a closer look at instances of objectivity talk in this commission reveals that they were rhetorical maneuvers to indicate the absence of epistemic vices. For example, Hacking quotes the salmon farmers association that relied on an expert and argued that "Dr. Noakes' demonstrates his objectivity in his more thorough analysis of the escapes issue which included consideration of escapees as potential vectors for disease" (Hacking 2015, p. 31). As Hacking points out, objectivity talk is used here to indicate the absence of vices such as sloppy analysis or conflict of interest. We do not lose anything by substituting "objectivity" with a more specific discussion of these ground level questions.

Hacking's suggestion to replace ambiguous objectivity talk with more specific discussions of epistemic vices appears attractive in debates about local knowledge. Instead of engaging in scholastic debates about the question whether local knowledge can be objective at all, we can focus on the question whether epistemic practices (local or otherwise) suffer from certain vices. While this suggestion seems attractive in the sense that it levels the playing field, it fails to capture an asymmetry that is of crucial importance for understanding the reality of debates about local knowledge.

Hacking's suggestion works just fine if we consider examples from scientific practice such as experts in the Sockeye Commission. If a scientist like Dr. Noakes can make the case that his research is not influenced by vices such as conflicts of interests, other members of the commission will take his results seriously. Unfortunately, this will not work for all stakeholders in the Sockeye affair. Most obviously, the knowledge systems of First Nations are often received with scepticism by Western scientists. This scepticism is usually not motivated by the assumption of a specific vice such as a conflict of interest but rather by the general assumption that First Nations lack the epistemic resources to explain complex ecological phenomena that are investigated by scientists. Limiting a conversation to "the proclaimed absence of this or that vice" (Hacking 2015, p. 26) often turns out to be a privilege because it presupposes that practices have the necessary epistemic potential as long as they are not distorted by vices.

To substantiate this worry with a real-life example, consider a different Canadian committee that was established to evaluate the population decline of a different species. The Ruby Range Sheep Steering Committee (RRSSC) was established in 1995 after the Kluane First Nation expressed concerns about the declining numbers of Dall Sheep in the nearby mountain ranges in the south West Yukon. The case of Dall Sheep resembles Hacking's example of Sockeye Salmon in the sense that a committee was established to tackle an issue that affected diverse stakeholders. For example, Dall Sheep have been an important part of the diet of the Kluane for more than 2000 years but they are also trophy animals that provide a substantial source of income for big game outfitters as well as the local government. Nadasdy (2003) provides a detailed account of the RRSSC and describes the attempts to integrate Indigenous and Western biological knowledge as an utter failure. While all participants in the committee agreed that the Dall Sheep population had declined, they endorsed vastly different accounts of the causes as well as potential solutions. The Kluane interpreted the population decline as a long-term and catastrophic phenomenon that required a complete (albeit temporal) hunting ban for all involved parties. Biologists in the committee considered the decline less worrying and assumed that it was mostly a temporal phenomenon due to unusually harsh winters.

As Nadasdy explains, the opposing judgments of different members of RRSSC reflected both different data and uses of the data in reasoning about the problem. Kluane elders and hunters relied on their personal experiences in interacting with Dall Sheep over an extended period of time in a geographic range that went beyond the Ruby Range. Elders had experience with Dall Sheep dating back to the 1920s and also included historical information that was handed down in the community for several generations. In contrast, biologists restricted themselves to data that was available within the Ruby Range since the first systematic survey in the 1970s. The different

judgments, however, were not only the consequence of different data. Kluane Elders were deeply sceptical of the claim that temporary weather conditions were the main cause of the population decline and suggested that this assumption was based on a superficial understanding of the land and the Dall Sheep. “They referred to the many years that they and/or their parents and grandparents had hunted in the area, claiming that this wealth of experience gave them knowledge of the sheep that far surpassed any that might be gained from a dozen or so annual surveys from a helicopter” (Nadasdy 2003, p. 191). Furthermore, the explanation was also rejected as ignoring or even disrespecting the sheep who are used to the harsh winters of the Yukon and implying that the sheep “were too ‘stupid’ to take care of themselves in their own home territory” (Nadasdy 2003, p. 177).

The scepticism was returned by biologists who ended up ignoring most of the arguments of the Kluane in their work for the RRSSC. In some cases, the evidence that was provided by Kluane elders and hunters did not fit in the geographical or temporal focus of the Ruggy Range since the 1970’s and was therefore discarded. However, there were deeper worries about the nature of the provided evidence that was based on personal experience. For example, Nadasdy remarks that a “biologist told me that he had misgivings about integrating TEK [Traditional Ecological Knowledge] and [scientific] knowledge because of the ‘subjective’ nature of TEK. He said that it was ‘too fluid and dependent upon individuals’ to be integrated with science”. (2003, p. 195).

My aim here is not to evaluate the competing accounts of the population decline but simply to point out that talking about the “proclaimed absence of this or that vice” can be a privilege. The involved biologists could indeed follow Hacking’s suggestion of focusing on epistemic vices such potential bias from the commercial interests of big game outfitters. In this context, questions of objectivity may appear as a hollow philosophical enterprise that does not add anything to the actually important questions in scientific practice. However, this is a privilege based on the institutional organization of the RSSCC in which the biologists had the power to decide what qualified as knowledge and “never really had to question their assumptions about the nature of research as a knowledge-producing activity” (Nadasdy 2003, p. 216). The situation was different for representatives of First Nations who were trying to make their voices heard: “Elders and hunters [...], however, told me they felt that the biologists were treating them ‘like children’ and ignoring what they had to say” (Nadasdy 2003, p. 212).

This asymmetry illustrates that sticking to questions about epistemic vices is often not enough. Indeed, Kluane elders and hunters could discuss potential vices of their own accounts. Is an account based on sufficient personal experience with the sheep populations? Is it influenced by biases such as personal gain from certain regulations? Does it take observations from other hunters sufficiently into account? And so on. Negative responses to these questions would provide reasons to reject a certain account but this was obviously not the problem in the case of the RRSSC. Even without any of these vices, the First Nation elders and hunters were not taken seriously because their epistemic practices were perceived as lacking the necessary virtues for producing objective knowledge about the status of the Dall Sheep population.

Indigenous knowledge holders can often not afford to limit themselves to a discussion of “this or that vice” as their epistemic practices are challenged at a more fundamental level. In the following section, I will therefore consider two virtues that are commonly associated with objectivity and argue that ethnobiology can often make convincing cases for both virtues in local epistemic practices. In Sect. 3, I will return to Hacking’s proposal and suggest that we should often replace general objectivity talk with a nuanced discussion of both epistemic virtues and vices.

## 2 Local knowledge as objective knowledge

Doubts about the objectivity of local knowledge usually do not focus on epistemic agents but on the practices they engage in. For example, the dismissal of First Nation elders and hunters in the Dall Sheep case did presumably not stem from the suspicion that they were less sincere than Western biologists about finding the causes of the population decline. Instead, RRSSC members suspected that even the most sincere and impartial Kluane would fail to gain reliable knowledge because their epistemic practices are “too subjective”. Following Douglas’ (2004) useful taxonomy of different notions of objectivity, it seems that the objectivity of processes of knowledge production (Douglas’ objectivity<sub>1</sub>) is at stake and not the objectivity of individuals (objectivity<sub>2</sub>) or groups (objectivity<sub>3</sub>) who engage in these processes. As Douglas points out, the objectivity of processes of knowledge production has been traditionally associated with gaining “a grasp of the real objects in the world” (2004, p. 456). And indeed, this seems to reflect worries that are commonly articulated against local knowledge. For example, the charge against Kluane in the Dall Sheep case was that their accounts simply failed to grasp what was *really going on*. Kluane (both as individuals and as a group) may have been sincere in wanting to identify the real causes of the population decline but their epistemic practices led them astray.

Moving from slogans like “grasp of the real objects in the world” to metaphysically less demanding formulations, Douglas suggests to distinguish between two senses of the objectivity of processes. On the one hand, there is *convergent objectivity* that reflects the convergence of results from different areas of inquiry. As Douglas points out, convergent objectivity is not only for scientists: “In everyday life, when an object continues to appear from a variety of vantage points and using a variety of techniques (e.g., both sight and sound), the possibility of illusion seems remote. As any birdwatcher will tell you, a convergence of evidence from various sources (e.g., bird coloration and song) assists greatly in the objective identification of the species under observation” (2004, p. 458). On the other hand, there is *manipulable objectivity* that reflects reliable ways of intervening in the world. Again, Douglas argues that manipulable objectivity is not limited to the sciences: “When we can use objects around us, we trust our accounts of their existence and properties as reliable. If I can reach out and drink from the glass of water, and it quenches my thirst, and I can fill it back up again, repeating the whole process reliably, I have good reason to trust the reliability of relevant beliefs about the glass” (2004, p. 457).

Both senses of objectivity specify virtues and not only the absence of vices in the sense of Hacking. It is therefore attractive to frame debates about the objectiv-

ity of Indigenous and other local knowledges in terms of the question whether they exhibit the virtues of convergent and manipulable objectivity. And indeed, issues of convergence have played an outstandingly important role in early ethnobiology. To illustrate this historical connection, consider Diamond's 1966 article "Zoological Classification System of a Primitive People" that investigated correlations between vertebrate categories (*ámana aké*) of the Fore of the New Guinea Highlands and taxa in biological systematics. Diamond did not only find convergence but immediately tied it to the objectivity of the categories employed: "The nearly one-to-one correspondence between Fore *ámana aké* and species as recognized by European taxonomists reflects the objective reality of the gaps separating sympatric species" (1966, p. 1102).

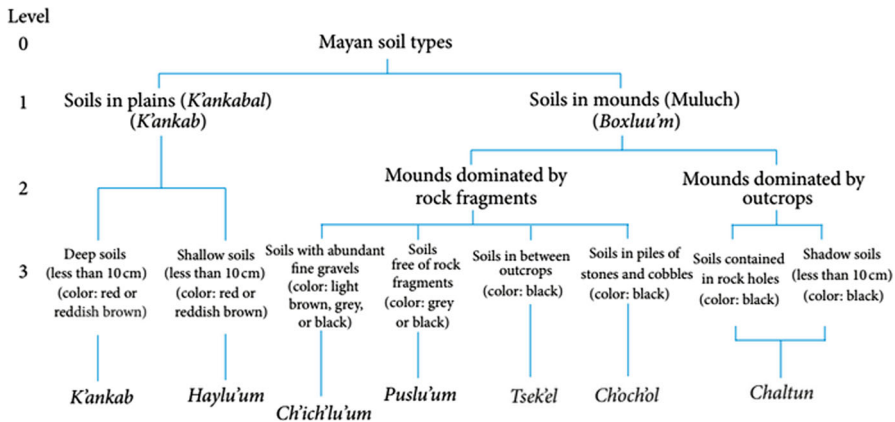
Diamond's article is only one of countless examples of early "intellectualist" ethnobiology that focused on cross-cultural taxonomic convergence (Hunn 2007). Early ethnobiologists not only collected data on taxonomic convergence in different geographic regions but also developed quantitative measures of convergence degrees (Hunn 1975) and general frameworks of supposedly universal rules in folk-biological classification (see Berlin 1992). This convergence research of early ethnobiologists not only constitutes a fascinating (and severely understudied—see Ludwig 2015a) case study for history and philosophy of science but seems to provide an illustration of Douglas' notion of *convergent objectivity*. If Indigenous and Western biologists come to recognize the same species independently from each other, we have an excellent example of how reaching the same result from different directions can indicate its objectivity.

While studies of cross-cultural taxonomic convergence may illustrate convergent objectivity, they arguably do not provide sufficient tools for a discussion of the objectivity of local knowledge. In fact, one may argue that these studies do not provide an account of local knowledge at all because they attempt to validate Indigenous knowledge by showing that it is often not genuinely local but rather converges with Western science. A substantial account of the objectivity of local knowledge should go beyond these results and show that Indigenous knowledge can be objective even if it does not converge with Western scientific knowledge. To address this issue, let us consider three sources divergence that commonly lead to local knowledge in ethnobiology.

## 2.1 Goal-dependency of ontologies

One common source of divergence is that Indigenous and Western scientific knowledge rely on ontologies that serve different epistemic and social goals. For example, consider ethnopedological research on Indigenous knowledge about soil types. Indigenous and Western pedological accounts of soil types typically converge to a certain degree as they rely partly on similar (e.g. morphological) properties that lead to similar classifications. While ethnopedological studies often correlate Indigenous and Western classifications of soil types, they also typically note substantial differences. To illustrate this, consider recent research on soil classifications in the municipality of Hocabá in Yucatán that are summarized in Fig. 1. The seven specific soil types that are identified by Estrada-Medina et al. (2013) do not converge on soil types of the World Reference Base for Soil





**Fig. 1** Mayan soil types in Hocabá, Yucatán (Estrada-Medina et al. 2013, p. 9)

Resources (WRB). As Estrada-Medina et al. (2013, p. 8) put it: “Many soils identified by farmers relate with more than one WRB group of soil and vice versa; in these cases, no direct relationship between both classification systems is possible.” For example, *Ch'ich'lu'um* is classified as a *Hyperskeletal Leptosol* in the WRB but the two kinds are not extensionally equivalent as the same is true for *Ch'och'ol lu'um*.

The goal-dependency of ontologies (Danks 2015; see also Dupré 1999; Chakravartty 2011; Ludwig 2015b) provides instructive examples of locality as it leads to knowledge about entities such as *Ch'ich'lu'um* that have no extensional equivalent in Western science. This introduction of new entities reflects local epistemic and social aims. For example, Hocabá soil classifications rely on properties such as soil depth, stoniness, or drainage conditions (Bautista and Zinck 2010, p. 7) that are important for agricultural practices of Maya communities. Knowledge that a soil is *Ch'ich'lu'um* and not *Ch'och'ol lu'um* may be local in the sense that it involves entities that do not even appear in Western taxonomies but it reflects regularities that are of crucial importance for local epistemic and social practices.

How does this knowledge fare with Douglas’ notions of convergent objectivity and manipulable objectivity? Convergence is limited through goal-dependency - agents that are not interested in properties such as soil depth, stoniness, or drainage conditions will not recognize the same soil types and regularities as Maya in the municipality of Hocabá. However, this does not undermine convergence between agents with similar aims. And indeed, Bautista and Zinck (2010, p. 9) stress high levels of convergence in soil knowledge among Yucatec Maya beyond Hocabá who share practices such as “making milpa” (a traditional crop-growing system that produces beans, maize, and squash).

While this convergence is limited to agents with similar aims, it would be unreasonable to tie objectivity to external convergence between Indigenous and Western researchers. Many results in Western science do not converge with results of Indigenous research but may still exhibit internal convergence when “disparate areas of research all point towards the same result” (Douglas 2004, p. 458). Instead of discussing these results in terms of “internal convergence”, one could also frame them in



terms of current debates about “robustness” in philosophy of science that rely on “the idea of the invariance of a result under multiple independent determinations” (Soler 2012, p. 3; see also Wimsatt 1981). The results of Indigenous and Western researchers may not converge on each other but still be robust in their respective target domains if they are confirmed through multiple means of determination.

Considerations of internal convergence or robustness are also common in ethnobiology as can be illustrated by a recent study (Prado et al. 2014) of knowledge about the life habits and habitats of mammals among Brazilian *quilombola* communities. While Prado et al. found high levels of internal agreement among the informants from different *quilombola* communities regarding life habits, information about habitats of some species such as the tayra (*Eira barbara*) lacked internal agreement. Prado et al.’s interpretations fits the idea of internal convergence as they argue that “the low levels of internal agreement and convergence” regarding habitats suggested a lack of knowledge among *quilombola* communities (2014, p. 10). Their discussion can also be framed in terms of robustness as confirmation through different *quilombola* communities can be seen as at least partly “independent determinations” of a result. This interpretation also fits Wimsatt’s suggestion that detectors for robustness can “make intensive use of intentional responses, such as questionnaires and various kinds of more passive survey data” (Wimsatt 2012, p. 94). Arguably, this is exactly what is going on in Prado et al.’s case where ethnobiological questionnaires suggested robustness regarding life habits but not regarding habitats.

Apart from issues of internal convergence and robustness, a consideration of manipulable objectivity also reinforces the impression that locality does not stand in the way of epistemic reliability. Yucatec Maya knowledge about soil may be shaped by local preferences and practices but it reflects empirically determined properties such as soil depth, stoniness, or drainage conditions. Given these pragmatically crucial properties, knowledge that a certain soil is *Ch’ich’lu’um* certainly enables reliable ways of intervening in the world in the sense of Douglas’ definition. In fact, one could hardly find a more straightforward example of “manipulable objectivity” as Maya farmers have been using their ethnopedological knowledge to “intervene in the world” for centuries in daily practices such as making milpa.

## 2.2 Local domains of inquiry

While the goal-dependency of ontologies is a common source of divergence between knowledge systems, there are other sources that have been carefully documented in ethnobiology. For example, Indigenous communities tend to be interested in regularities that occur within a specific environment while Western scientists often focus on regularities that are stable across environments. Again, consider the case of soil types. Ethnopedological knowledge among Yucatec Maya converges at least in part because the entire Yucatán peninsula involves “repetition of four geomorphic systems all over the area: coastal, karstic, tectono-karstic, and fluvio-paludal, each one showing specific soil-relief patterns” (Bautista and Zinck 2010, p. 9). For Yucatec Maya, these patterns matter and it is not relevant whether their taxonomy is also applicable in other regions

beyond Yucatán. In contrast, Western pedologists often aim at uncovering regularities that are stable across a range of different regions.

The observation that Indigenous knowledge often reflects locally occurring patterns that tend to be ignored by Western scientists is widely acknowledged in ethnobiology and often cited as one of the main reasons to incorporate local knowledge systems in environmental management (Berkes and Folke 2002; Chalmers and Fabricius 2007; Vandebroek 2011). Of course, a focus on locally occurring patterns sets limits to convergence across environments. However, convergence is still possible between agents who are concerned with the same domain of inquiry. This type of geographically and/or temporally restricted convergence is also common in Western ecological research where scientists may come to convergent conclusions about ecological dynamics in a specific research context. Furthermore, we can clearly apply Douglas' account of manipulable objectivity as knowledge about local patterns can provide tools for reliable interventions in a given domain of inquiry. In fact, attention to local patterns that do not require generalization can lead to epistemically more fruitful strategies which is reflected in the ethnobiological observation that local knowledge of Indigenous communities can "often be superior to Western science in its ability to predict local phenomena" (Pierotti 2010, p. 67).

### 2.3 Locality of methods

So far, I have discussed knowledge divergence that is caused by engagement with different phenomena. Ethnobiological knowledge often diverges from Western biological knowledge because it is concerned with properties that are of unique relevance for Indigenous practices or with patterns that occur only in a restricted domain of inquiry. However, divergence can also occur in cases in which Indigenous and Western biologists are concerned with the same phenomena in the same domain of inquiry but employ different methods. To illustrate this, consider Marlor's (2010) helpful case study of Kwakwaka'wakw clam diggers and researchers of the Department of Fisheries and Oceans (DFO) on the West coast of Canada. Marlor documents different methods of DFO biologists and Kwakwaka'wakw clam diggers in assessing the abundance of clams. The DFO survey "involved mapping the perimeters of the area on a beach in which clams were expected or known to live, randomly selecting a predetermined number of points within the perimeter to dig, digging up all clams within a designated square area around the randomly selected point, and taking the clams back to a lab to weigh, count and measure" (Marlor 2010, p. 518). In contrast, Kwakwaka'wakw assessed clam abundance on the basis of the harvest outcome. Furthermore, Marlor points out that this harvest involves complex tacit knowledge and is most clearly embodied in old-time diggers who were able to "read" the beach well.

While DFO biologists and Kwakwaka'wakw did not disagree on clam abundance, tensions still resulted from the biologists' unwillingness to incorporate Kwakwaka'wakw knowledge in the DFO surveys. Marlor argues that the main obstacle for integration was the Kwakwaka'wakw use of methods that were not standardized in a way that would allow replication by outsiders. I will return to the issue of replication in the next section, but it should be clear that lack of formal standardization

does not undermine the possibility of convergent or manipulable objectivity. Tacit knowledge in a community may not only lead to convergence but also to agreement with communities that employ standardized methods. In fact, DFO biologists and Kwakwaka'wakw largely converged in their assessment of clam abundance. But even in cases of disagreement, standardized methods do not always imply higher trustworthiness. Marlor, for example, points out that butter clams tend to live adjacent to rock walls that had to be excluded in a survey with straight perimeters. Of course, this does not imply that the standardized assessments were less trustworthy than the assessments of Kwakwaka'wakw. However, there is also no reason to assume that standardized methods of Western scientists will always lead to more reliable assessments and disagreements will have to be evaluated on a more detailed engagement with the specifics of the individual case studies.

Beyond the issue of convergence, it should also be uncontroversial that the employment of tacit knowledge that is not formally standardized can meet criteria of manipulable objectivity. Indeed, Kwakwaka'wakw knowledge about the abundance of clams clearly enables reliable ways of intervening in the world as it has been used for generations to support Kwakwaka'wakw clam digging.

Let us take stock. I presented three sources of locality that commonly lead to divergence between Indigenous and Western scientific practices. *First*, I used the example of soil types to show that divergence often reflects the goal-dependency of ontologies. *Second*, I argued that divergence is also often the result of different domains of inquiry. For example, Yucatec Maya are interested in patterns of the Yucatán peninsula while a Western pedologist may be interested in broader patterns that occur across geographic regions. *Third*, I suggested that different methodological standards can lead to divergence as illustrated by the case of Kwakwaka'wakw clam diggers. While all three sources of locality can lead to considerable differences between Indigenous and Western scientific knowledge, I have argued that none of them undermine the possibility of objectivity along Douglas' formulation of convergent and manipulable objectivity. Of course, local Indigenous practices can fail to meet these criteria (Davis and Ruddle 2010) but this is true for all epistemic practices.

### 3 From objectivity to a diversity of virtues and vices

While Hacking's proposal to replace objectivity talk with discussions of epistemic vices is attractive, I have argued that it remains unsatisfying in many cases of local knowledge. Hacking's example of the Sockeye Commission is convincing if we only focus on scientists who already agree on the norms of knowledge production. In contrast, Indigenous knowledge holders often face not only doubts about Hacking's "absence of this or that vice" (2015, p. 26) but are challenged on a more general level of basic epistemic virtues that are associated with objectivity. Furthermore, I have argued that ethnobiological research illustrates that local knowledge often comes with epistemic virtues such as (external or internal) convergence and manipulability. Despite my argument that a discussion of epistemic vices is often not sufficient, I still think that we can learn from Hacking's suggestion to discuss "ground level questions"

instead of “elevator words” such as “objectivity”. Indeed, it is helpful to distinguish between two claims in Hacking’s proposal:

1. Objectivity talk is only about vices and not about virtues
2. Objectivity talk is ambiguous and it is usually better to discuss specific “ground level questions”

My criticism has focused on (1). Not everyone can get away with only talking about vices because not everyone has knowledge that is treated as having virtues necessary to be taken seriously. However, this criticism is entirely compatible with Hacking’s second suggestion that we are usually better off discussing ground level questions instead of elevator words such as “objectivity”. In the following, I will argue that Hacking’s framework is actually very convincing in ethnobiology if we include both vices and virtues in our ground level discussions.

In the last section, I focused on two epistemic virtues that are commonly considered hallmarks of objectivity: convergence and manipulability. I have argued that these virtues are by no means exclusive to Western science but also common in local ethnobiological knowledge. This is an important result because it challenges not only a common source of marginalization of local knowledge (Ludwig 2016) but also the idea that local and Western scientific knowledge are separated by a clear methodological divide. In this sense, the results support Agrawal’s (1995, 2009, cf. Whyte 2013) influential arguments that the conceptual divide between Indigenous and scientific knowledge obscures how “knowledge can be useful or useless, politically salient or meaningless, socially relevant or irrelevant, empirically testable or irrefutable, and ideologically open or blind, without reference to whether it is indigenous or scientific” (Agrawal 2009, p. 157).

While attention to shared epistemic virtues is important, there is also a danger of assimilating local ethnobiological knowledge to Western scientific knowledge in a way that blurs epistemically and politically relevant differences. First, if we limit ourselves to pointing out that local knowledge meets standard criteria for objectivity, it becomes unclear why many forms of local knowledge remain marginalized in scientific practice. Second, my discussion in the last section was asymmetric insofar as it only considered whether local knowledge can have virtues that are commonly ascribed to science. This perspective does not even touch the question what virtues may be unique to local knowledge. As Hacking (2015, p. 27) points out, such a perspective is “already loaded [...] the objectivity of the sciences is not in question, but that of aboriginals is.”

Following Hacking’s suggestion to discuss ground level questions, we can address the epistemic virtues of different forms of knowledge without having to condense them into one general notion of objectivity. First, this helps to tackle the question why Indigenous and other local forms of knowledge often have a hard time being taken seriously. To be sure, many forms of marginalization have little to do with epistemic virtues and are more adequately explained in terms of political factors such as the privilege of deciding what questions count as relevant. Recall that I argued in the last section that ethnobiological knowledge is often local because it is shaped by the demands of epistemic and social practices of specific contexts. For example, ethnobiological knowledge may be concerned with properties that are important for

a local community or focus on regularities that are only found in a restricted domain. A scientist who does not share the interests of this community but has the privilege to decide what issues count as significant may ignore Indigenous knowledge (Ludwig 2016; see Kitcher 2003 and Dupré 2015 for a more general discussion on what truths count as “significant”).

Despite these political mechanisms that can lead to the marginalization of local ethnobiological knowledge, there are also methodological issues that can be framed in terms of epistemic virtues. For example, recall my discussion of the tension between Kwakwaka’wakw clam diggers and DFO biologists. Marlcor’s (2010) discussion clearly shows that DFO biologists were reluctant to include Kwakwaka’wakw knowledge because it failed to satisfy criteria of formal standardization. Is formal standardization an epistemic virtue? One may argue that it is not a global epistemic virtue as there are also other mechanisms of ensuring reliability of knowledge. Kwakwaka’wakw knowledge about clams is clearly reliable in many ways but reliability is achieved through other mechanisms such as personal training in collaboration with experienced clam diggers. Still, formal standardization is arguably considered an important virtue in the context of modern scientific practices and, as Marlcor points out, linked to the value of transparency: “Specifically, I argue that practices related to accountability create a structural barrier [...] scientists need to legitimize their claims and advice to others by using acceptable, ‘replicable’ methods, peer review, and the publication of their reports to create the overall general appearance of ‘transparency.’ The result is that practitioners who employ alternative ways of knowing, such as Indigenous peoples [...] are often dismissed” (2010, p. 514).

Talking about a diversity of epistemic virtues instead of a general notion of objectivity is clearly helpful in providing a nuanced picture. While ethnobiological knowledge often shares virtues such as convergence and manipulability with Western scientific knowledge, it usually lacks other virtues such as formal standardization and transparency that are considered crucial in institutionalized scientific practice. Furthermore, a fine-grained discussion that moves beyond a general discussion of objectivity also allows to address epistemic virtues that are unique to local practices. I have argued that ethnobiological knowledge is often local in the sense that it is concerned with phenomena that are of outstanding importance for the practices of Indigenous communities but widely ignored in scientific contexts. In Sect. 2, I specified this locality with three common sources of divergence that lead to the recognition of different properties, regularities, and patterns.

The idea that local knowledge has the epistemic virtue of exposing blind spots of a homogeneous scientific community is not new but well-known from debates about Harding’s (1995) concept of “strong objectivity” and standpoint theory more generally (e.g. Wylie 2003). Standpoint theorists point out that marginalized accounts are often capable to detect biases in scientific research. For example, an Indigenous community may help to identify shortcomings of a biological model that does not pay sufficient attention to the peculiarities of a local ecosystem. However, ethnobiological knowledge does not only have the function of exposing vices in Western perspectives but has primarily the virtue of supporting practices of local communities. Ethnobiological knowledge systems are misunderstood if they are only (or primarily) seen

as correctives for Western science as they are adapted to support local epistemic and social practices. As such, local ethnobiological knowledge has the virtue of reflecting the needs of particular communities and therefore constitutes what Whyte (forthcoming) has recently called a “governance value” that enables “Indigenous peoples’ self-determination”.

## 4 Conclusion

Debates about the status of Indigenous knowledge often get caught in an unhelpful dichotomy of universalism and relativism. Universalism has a long tradition in ethnobiology with researchers postulating universal taxonomic structures and stressing “that the ethnobiological knowledge of traditional peoples conforms in many respects to basic scientific principles” (Berlin and Berlin 1996, p. 3; see also Berlin 1992). While this universalist tradition has led to important research results, it seems to take Indigenous knowledge seriously only because (and insofar) as it resembles Western scientific knowledge. As such, it does not provide an account of knowledge that is local in a more substantive sense that requires divergence from scientific knowledge (Ludwig 2016). In contrast with this universalist approach, relativist approaches in anthropology have also strongly influenced ethnobiological practice and clearly leave more room for divergence between Indigenous and modern scientific knowledge systems. However, this incorporation of divergence comes at the price of rejecting substantive notions of objectivity.

While universalist and relativist models undermine substantive notions of either locality or objectivity, I have argued that ethnobiological knowledge is often local in the sense that it diverges from scientific knowledge but still satisfies standard criteria for objectivity that have been proposed in philosophy of science. More specifically, I have identified three common sources of locality. Ethnobiological knowledge (a) relies on ontologies that are shaped by the requirements of local goals, (b) reflects regularities and patterns are often only stable in restricted environments, and (c) uses methods that avoid formal standardization. However, none of these features stand in the way of manipulable or convergent objectivity as they have been proposed by Douglas (2004). In this sense, my discussion of ethnobiology complements recent attempts to introduce Indigenous perspectives to philosophy of science and to stress their epistemic reliability and “objectivity” (Harding 2015; Koskinen 2015; Wylie 2015).

Characterizing Indigenous knowledge as “objective” is often not only epistemically but strategically justified. Given that the supposed lack of objectivity plays an important role in the marginalization of Indigenous perspectives, it is often rhetorically important to point out that standard criteria for objectivity are not exclusively met by Western science. Still, general discussions of objectivity can also blur important differences and I have suggested that it is usually more helpful to focus of diverse epistemic virtues and vices. Stressing the “objectivity of Indigenous knowledge” may be strategically beneficial but can also have the opposite effect of taking Indigenous knowledge seriously only insofar as it meets standards of Western science. As Nadasdy (2005) and other anthropologists have warned, enthusiasm about the integration of Indige-



nous and Western science has often led to the exclusion of knowledge that is not useful to Western scientists. Shifting the perspective from a general notion of objectivity to diverse epistemic virtues therefore often provides a more adequate picture. On the one hand, Indigenous and Western perspectives often have virtues in common as illustrated by Douglas' notions of convergent and manipulable objectivity. On the other hand, it is also of crucial importance to recognize that different knowledge systems have different virtues and are often adapted to meet epistemic and social goals of specific communities.

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